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TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35.U.S.C. 371

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U.S. APPLICATION NO
t/bra 10/019719

INTERNATIONAL APPLICATION NO
PCT/DE00/02076

INTERNATIONAL FILING DATE
July 3, 2000

PRIORITY DATE CLAIMED
July 2, 1999

TITLE OF INVENTION **METHOD FOR MONITORING OR INSTALLING NEW PROGRAM CODES IN
AN INDUSTRIAL INSTALLATION**

APPLICANT(S) FOR DO/EO/US **Joachim Hoehne and Thomas Helmke**

Applicant herewith submits to the United States Designated /Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.
3. ☐ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(I).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☐ A copy of the International Search Report (PCT/ISA/210)
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☐ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

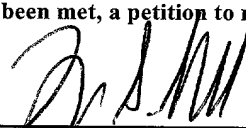
Items 11. to 16. below concern other document(s) or information included:

11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409)
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A FIRST preliminary amendment.
☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☐ Other items or information:
 - a. ☐ a copy of the International Search Report (PCT/ISA/210)
 - b. ☐ a copy of the International Preliminary Examination Report (PCT/IPEA/409)

German version of application; cover page of PCT international application PCT/DE00/02076; postcard; and check in the amount of \$870.00.

10/019719

JC13 Rec'd PCT/PTO 21 DEC 2001

INTERNATIONAL APPLICATION NO PCT/DE00/02076		INTERNATIONAL FILING DATE July 3, 2000		PRIORITY DATE CLAIMED July 2, 1999	
17. <input type="checkbox"/> The following fees are submitted:				CALCULATIONS <small>PTO USE ONLY</small>	
Basic National Fee (37 CFR 1.492(a)(1)-(5)): Neither international preliminary examination fee (37 CFR 1.482) Nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO (1.492(a)(3)) \$1,040 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO (1.492(a)(5)) \$890.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO (1.492(a)(2)) \$740.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) (1.492(a)(1)) \$710.00 International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00					
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Claims	Number Filed	Number Extra	Rate	\$	
Total Claims	8 -20=	0	X \$ 18.00	\$	0
Independent Claims	3 -3=	0	X \$ 84.00	\$	0
Multiple dependent claim(s) (if applicable)			+ \$280.00	\$	
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Reduction by 1/2 for filing by small entity, if applicable.				\$	
SUBTOTAL =				\$	740
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a. <input checked="" type="checkbox"/> A check in the amount of \$ 870 to cover the above fees is enclosed. b. <input type="checkbox"/> Please charge our Deposit Account No. 02-4377 in amount of \$ to cover the above fees. A copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-4377. A copy of this sheet is enclosed.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO: Louis S. Sorell BAKER BOTTS L.L.P. 30 Rockefeller Plaza New York, New York 10112-4498					
Attorney: Louis S. Sorell  PTO Reg: 32,439					
12/21/01 Date					

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13 Rec'd PCT/PTO 21 DEC 2001

BAKER BOTTS LLP

Attorney Docket Number: A34900-PCT-USA

Title: METHOD FOR MONITORING OR INSTALLING NEW PROGRAM CODES IN AN INDUSTRIAL
INSTALLATION

Use Space Below for Additional Information:

Description

Method of monitoring or installing new program codes in an industrial installation

5

The invention relates to a method of monitoring an industrial installation or installing new program codes in an industrial installation.

10 For the purpose of remote monitoring of industrial installations as is known, appropriate process logs and log files from their automation systems are evaluated. Decisions, for example as to how warning messages are to be reacted to, can as a result be made only with a
15 relatively large time delay, since the evaluation of the information is basically carried out offline. Special problems are caused, for example, by the fact that installations and evaluation center can be located in different time zones, or that appropriately qualified
20 personnel are not available 24 hours per day. It is therefore possible that an evaluation is carried out with some hours delay, and the log files needed for the evaluation have already been overwritten. In addition, as a result of the random evaluation, it is is not possible
25 to react to all fault messages, since not all the information is transmitted. For this reason, complete and comprehensive remote monitoring of an industrial installation is possible is possible only to a restricted extent. For industrial installation, in particular
30 installations in the raw materials industry, it is additionally desirable to improve the installation of program codes, in particular control program codes, for the closed-loop and open-loop control of the industrial

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installation, in particular the installation in the raw
materials industry, and its subsystem. Accordingly, it is
an object of the

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invention to permit improved monitoring of a large industrial plant.

5 According to the invention, the object is achieved by a method as claimed in claim 1. In this case, a mobile program code for the closed-loop or open-loop control of an industrial installation, in particular

an installation in the raw materials industry, is transmitted from an evaluation center or development center to the industrial installation, in particular the installation in the raw materials industry, and is
5 installed and commissioned independently on the industrial installation.

In an advantageous refinement of the invention, the installed mobile program code generates further mobile
10 program codes in accordance with a predefined task, said program codes being transmitted within the industrial installation.

In a further advantageous refinement of the invention, information is transmitted between the evaluation center
15 or the development center and the industrial installation, in particular the installation in the raw materials industry, via ISDN, satellite or Internet.

In an advantageous refinement of the invention, the mobile program code is JAVA program code.
20

In an advantageous refinement of the invention, the mobile program code runs on hardware provided for the
25 open-loop or closed-loop control of the industrial installation, in particular the installation in the raw materials industry.

In a further advantageous refinement of the invention, the installed mobile program code for the closed-loop and
30 open-loop control of the industrial installation is designed to monitor the industrial installation. In this case, monitoring of an industrial installation, in particular an installation in the raw materials industry,

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is carried out by means of a mobile program code which monitors the industrial installation, in particular the

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installation in the raw materials industry, automatically
for faults or special events, in the event of a fault or
a special event, the information needed to evaluate the
fault or the special event being transmitted by means of
5 the mobile program code or a further mobile program code
to

an evaluation center separated physically from the industrial installation, in particular the installation in the raw materials industry. In this case, special events are to be understood as violations of limiting values or trends or the occurrence of regular print-outs of particular significance. Special events can in addition be tolerance deviation of process data (strip profile faults temperature faults, and so on) or special features in the convergence behavior in the adaptation of models. In this way, much faster and more comprehensive evaluation of faults, limiting value violations and so on is possible. It is further of particular advantage to carry out the recognition of trends of looming faults by means of the information determined by the mobile program code. This permits, for example, preventative maintenance of a corresponding installation.

In an advantageous refinement of the invention, the mobile program code forms and dispatches new mobile program code, the new mobile program code monitoring parts of the industrial installation, in particular the installation in the raw materials industry, automatically for faults or special events, in the event of a fault or a special event, the information needed to evaluate the fault or the special event being transmitted directly to the evaluation center or, in particular for further transmission to the evaluation center, to another mobile program code.

Further advantages and details emerge from the following description of an exemplary embodiment.

The FIG shows, in an exemplary configuration, an industrial installation 30, illustrated schematically,

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with its control system and its actuators and sensors,

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without the actual process sequence. The industrial
installation 30 has an industrial Ethernet bus 9, which
provides a data connection between two identically or
differently configured automation devices 5 and 6, an
5 operating

computer 4 and a commissioning computer 1. The industrial Ethernet bus 9 is connected to a standard Ethernet bus 8 via a computer 7. An operating computer 2 and a central operating computer 3 are connected to the standard Ethernet bus 8. Via a bus system 23, which is designed as a Profibus, various actuators or sensors 12, 13, 14, 15 are provided with a data connection to the automation device 5. Furthermore, a decentralized peripheral 10 is connected to the automation device 6 via the bus system 23. Via a bus system 24, which is designed as a Profibus, various actuators or sensors 16, 17, 18, 19 are provided with a data connection to the automation device 6. Furthermore, a decentralized peripheral 11 is connected to the automation device 6 via the bus system 24. Via the decentralized peripheral 11, various actuators and sensors 20, 21, 22 can be driven or evaluated via the automation device 6. The operating computers 2, 3, 4, the automatic devices 5, 6, the decentralized peripherals 10, 11, the actuators or sensors 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and the bus systems 8, 9, 23, 24 serve the operation of the industrial installation.

Reference symbol 40 designates an evaluation center that is separated physically from the industrial installation 30 and is advantageously also used as a development center. In an exemplary configuration, the evaluation center 40 has a computer system having, for example, a plurality of computers 41 and 42 coupled via a bus system 43. A communication link 50 provides a data connection between the industrial plant 30 and the evaluation center 40. In this case, this does not have to be a so-called dedicated line. In an exemplary configuration, the industrial plant 30 and the evaluation center 40 have a data connection to each other via the commissioning

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computer 1 on the side of the industrial installation 30
and the computer 41 on

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the side of the evaluation center 40. In order to monitor the industrial installation 30, mobile program code is transmitted from the computer 41 to the commissioning

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computer 1. By means of the transmitted mobile program code, which runs on the commissioning computer 1, the other components 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 are monitored for faults or special events, such as limiting value violations. For this purpose, the mobile program code operating on the commissioning computer 1 automatically generates further mobile program codes, which are transmitted from the commissioning computer 1 to the automation devices 5, 6, the decentralized peripherals 10 and 11 and to the actuators or sensors 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22 and, if appropriate, to the operating computers 2, 3, 4. If one of these transmitted mobile program codes detects a fault or the special event, then this mobile program code transmits a communication relating to this fault or the special event and also all the information needed for evaluation to the mobile program code installed on the commissioning computer 1, which sets up the communications link 50 to the computer 41 and then transmits this information to the computer 41. The transmitted information can, for example, be log files which are generated on the basis of warning and error messages. Furthermore, it may be tolerance deviations of process data (for example strip profile faults temperature faults and so on), adaptation coefficients or coefficients from neural networks and the states of computers (for example memories, hard disk capacity, CPU loading and so on). In addition, provision can be made to register the frequency of warning messages and to evaluate it statistically.

The mobile program code is particularly advantageously implemented in JAVA. This is preferably carried out by following the Aglet concept, as disclosed by D.B. Lange,

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M. Oshima: "Programming and Developing JAVA Mobile Agents
with Aglets", Edison-Wesley, 1998.

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The invention is used particularly advantageously in rolling mills.

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Patent claims

1. A method of installing a mobile program code for the closed-loop or open-loop control of an industrial installation, in particular an installation in the raw materials industry, the mobile program code being transmitted from an evaluation center (40) or development center to the industrial installation, in particular the installation (30) in the raw materials industry, and being installed and commissioned independently on the industrial installation (30).
2. The method as claimed in claim 1, characterized in that the mobile program code on the industrial installation (30) generates further mobile program codes in accordance with a predefined task, and these further mobile program codes are transmitted within the industrial installation (30).
3. A method as claimed in claim 1, characterized in that the mobile program codes are transmitted between the evaluation center (40) or the development center and the industrial installation (30) via ISDN, satellite or Internet.
4. The method as claimed in claim 1 or 2, characterized in that the mobile program code is JAVA program code.
5. The method as claimed in claim 4, characterized in that the mobile program code runs on hardware provided for the open-loop or closed-loop control of the industrial installation (30).

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the installed mobile program code for the closed-loop or open-loop control of the industrial installation (30) is designed to monitor the industrial installation (30).

5

7. The method as claimed in claim 6, characterized in that the mobile program code monitors the industrial installation (30) independently for faults or special events, in the event of a fault or a special event the information needed to evaluate the fault or the special event being transmitted to the evaluation center (40) by means of the mobile program code or a further mobile program code.

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Abstract

Method of monitoring or installing new program codes in an industrial installation

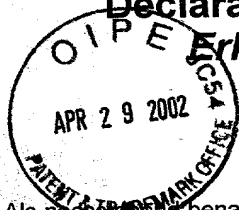
A method of monitoring an industrial installation, in particular an installation in the raw materials industry, by means of a mobile program code, which monitors the industrial installation, in particular the installation in the raw materials industry, automatically for faults or special events, in the event of a fault or a special event, the information needed to evaluate the fault or the special event being transmitted by means of the mobile program code or a further mobile program code to an evaluation center separated physically from the industrial installation, in particular the installation in the raw materials industry.

FIG. 1

Declaration and Power of Attorney For Patent Application

Erklärung Für Patentanmeldungen Mit Vollmacht

German Language Declaration



Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Verfahren zur Ueberwachung oder zur Installation neuer Programmcodes in einer industriellen Anlage

deren Beschreibung

(zutreffendes ankreuzen)

☐ hier beigefügt ist.

☒ am 03.07.2000 als

PCT internationale Anmeldung

PCT Anmeldungsnummer PCT/DE00/02076

eingereicht wurde und am

abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Method for monitoring or installing new program codes in an industrial installation

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on 03.07.2000 as

PCT international application

PCT Application No. PCT/DE00/02076

and was amended on _____ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

German Language Declaration

Prior foreign applications
Priorität beansprucht

Priority Claimed

19930660.5

DE

02.07.1999

☒

☐

(Number)
(Nummer)

(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

Yes
Ja

No
Nein

(Number)
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(Country)
(Land)

(Day Month Year Filed)
(Tag Monat Jahr eingereicht)

☐
Yes
Ja

☐
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Nein

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(Day Month Year Filed)
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☐
Yes
Ja

☐
No
Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

PCT/DE00/02076

(Application Serial No.)
(Anmeldeseriennummer)

03.07.2000

(Filing Date D, M, Y)
(Anmeldedatum T, M, J)

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(patentiert, anhängig,
aufgegeben)

pending

(Status)
(patented, pending,
abandoned)

(Application Serial No.)
(Anmeldeseriennummer)

(Filing Date D,M,Y)
(Anmeldedatum T, M, J)

(Status)

(patentiert, anhängig,
aufgeben)

(Status)

(patented, pending,
abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden können, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

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And I hereby appoint

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Voller Name des einzigen oder ursprünglichen Erfinders: <u>1-00</u>		Full name of sole or first inventor:	
<u>JOACHIM HÖHNE</u>		<u>JOACHIM HÖHNE</u>	
Unterschrift des Erfinders	Datum	Inventor's signature	Date
		<u>Joachim Höhne</u>	<u>21.12.01</u>
Wohnsitz		Residence	
<u>ERLANGEN, DEUTSCHLAND</u>		<u>ERLANGEN, GERMANY DEX</u>	
Staatsangehörigkeit		Citizenship	
<u>DEUTSCH</u>		<u>GERMAN</u>	
Postanschrift		Post Office Address	
<u>ANTON-BRUCKNER-STR. 13</u>		<u>ANTON-BRUCKNER-STR. 13</u>	
<u>91052 ERLANGEN</u>		<u>91052 ERLANGEN</u>	
<u>DEUTSCHLAND</u>		<u>GERMANY</u>	
Voller Name des zweiten Miterfinders (falls zutreffend): <u>2-00</u>		Full name of second joint inventor, if any:	
<u>Thomas Heimke</u>		<u>Thomas Heimke</u>	
Unterschrift des Erfinders	Datum	Second Inventor's signature	Date
		<u>Thomas Heimke</u>	<u>21.12.01</u>
Wohnsitz		Residence	
<u>Erlangen, DEUTSCHLAND</u>		<u>Erlangen, GERMANY DEX</u>	
Staatsangehörigkeit		Citizenship	
<u>DEUTSCH</u>		<u>GERMAN</u>	
Postanschrift		Post Office Address	
<u>Taunusstrasse 33</u>		<u>Taunusstrasse 33</u>	
<u>91056 Erlangen</u>		<u>91056 Erlangen</u>	
<u>DEUTSCHLAND</u>		<u>GERMANY</u>	

(Bitte entsprechende Informationen und Unterschriften im Falle von dritten und weiteren Miterfindern angeben).

(Supply similar information and signature for third and subsequent joint inventors).